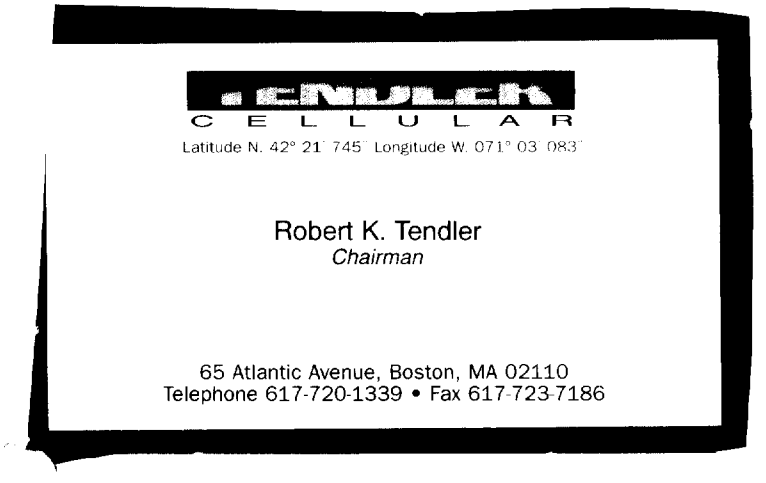
APPENDIX A

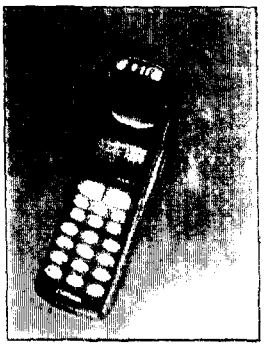

CELLULAR
Latitude N. 42° 21' 745" Longitude W. 071° 03' 083"
Robert K. Tendler
Chairman
65 Atlantic Avenue, Boston, MA 02110
Telephone 617-720-1339 • Fax 617-723-7186

SECTION P

SUNDAY, AUG. 24, 1997

The Atlanta Journal-Constitution

Personal TECHNOLOGY



Cellular to the rescue

New technology allows rescue workers to pinpoint a cellular phone user's location after a call comes in to 911.

TECH REPORT, P2

Pinpointing cellular users now possible

By Michael E. Kanell
STAFF WRITER

It is not enough to call for help if your rescuers don't know where you are.

Someone in trouble may not be capable, may not have time or may be too young to give an accurate address when they call 911. That is the reason behind "enhanced 911," technology that makes the location of someone making a phone call to 911 from home, office or a pay phone immediately available to the police — at least in many parts of the country.

There's no chance of rescue without knowing where to go.

Complicating the problem is that an increasing number of 911 calls are made by people with wireless phones, which are, by definition, not tethered to any address. That's ironic, when you consider that surveys by the **Cellular Telecommunications Industry Association** show safety is the primary reason that a large portion of wireless users have the phones. Moreover, about one in four emergency calls is made from a cellular phone.

And since industry groups have recently marked the 50 millionth customer for a wireless phone, it is not just a fringe group of technophiles we are talking about. With that in mind, the **Federal Communications Commission** recently mandated the use of technology that will let authorities track a wireless user in trouble.

That can be done in several ways. One is to use a global positioning system, or GPS, with a receiver in the phone handset that beams a signal to a satellite, which in turn conveys a precise designation of longitude and latitude to authorities on Earth.

A Boston company, founded by the patent attorney for **Mitsubishi Electronics,** soon will go one step better. **Tendler Cellular Inc.** makes a chip that will use a synthesized voice to tell police or emergency technicians where — to within a few feet — the 911 call was made.

Users will pay a monthly fee of $4 to cover the cost of the FoneFinder chip, said founder Robert Tendler last week, sitting in his car alongside a New Hampshire road, discussing the product via cellular phone. "There are a number of solutions, and we think this is the best."

Tendler Cellular

Cellular telephones equipped with the FoneFinder chip can be tracked by emergency personnel.

As it happened, Tendler was lost as he spoke. It was suggested to him that the situation was ironic, because GPS could tell him his precise location but not the route to his next meeting.

He disagreed. First — being a guy — he was nowhere near giving up on trying to find his way on his own. Besides, his company had an arrangement with an auto club so he could call it and use the FoneFinder, he said. "They know where you are because this thing tells them. They can tell you where to go."

FoneFinder will be available in October. For more information, Tendler suggests that consumers contact their local wireless provider, or try Tendler Cellular by phone (800-896-4440) or by calling up its Internet site (http://www.fonefinder.com).

Business

THE BOSTON GLOBE • TUESDAY, SEPTEMBER 2, 1997

AP PHOTO

Robert Tendler displays his cell phone with global positioning system (GPS) satellite capability.

Communications: *Cellular phones*

An SOS at your fingertips

Inventor: Device can deliver power of satellites to rescues

By Hiawatha Bray
GLOBE STAFF

SOME LAWYERS CHASE AMBULANCES. Attorney Robert Tendler wants to tell them where to go.

Tendler, a Boston patent lawyer, has developed a cellular telephone accessory that can help emergency service workers locate people in trouble. The device, called a FoneFinder, could help the cellular phone industry meet a federal mandate to provide high-quality 911 emergency service to customers.

"It's extremely exciting to invent something that helps people and makes money on the side," said Tendler, who started his own business, Tendler Cellular, to produce the device. But he might have to wait for the money. While industry experts say FoneFinder is a promising technology, none of the major cellular phone networks has yet agreed to offer it.

Cellular phone-maker Audiovox Inc. is ready to start production and could begin offering the units in a few months. But most cell phones are sold by the companies that provide cellular service, and they are still trying to decide which phone-locator technology to deploy.

They'd better decide quickly. The Federal Communications Commission wants cellular phone companies to provide a basic location system by October, and a much more accurate method by 2001.

CELLULAR PHONE, Page C 10

Inventor sees cell phone device as way to help users in distress

■ CELLULAR PHONE
Continued from Page C1

"We have unleashed the engineers at this point," said Tim Ayers, vice president of communications for the Cellular Telecommunications Industry Association in Washington.

But Tendler, 55, believes he's already engineered a solution. FoneFinder adds a few inches and ounces to a typical cell phone. It contains a special flat antenna that can pick up signals from Global Positioning System satellites, which orbit the earth. These signals are sent to a set of microchips that uses the data to calculate the latitude and longitude of the telephone. At least three GPS satellites must be within range for the system to work, but that's usually not a problem when the phone is outdoors.

"The only places it doesn't work is inside a building, under an overpass, or where the buildings are so high that no satellites are available," Tendler said.

The alternative approach to locating a cell phone involves triangulation. That's a process in which several cellular relay sites would pick up transmissions from the phone and calculate its location. No one doubts that this approach will work. But cellular industry expert Herschel Shosteck noted that with current technology, it would cost the industry several billion dollars to install such a system nationwide.

Once FoneFinder has figured out a location, it constantly updates the information as the phone is moved. When the phone loses contact with a GPS satellite, FoneFinder memorizes the last location fix.

In an emergency, the caller can push a button on the phone. It dials 911, and then a special chip announces the latitude and longitude information in a clear voice. A 911 operator could then use this information to find the caller. With the push of another button, the phone will announce its location without calling the police, so the user has a handy way to nail down his own location.

Tendler majored in physics and math at Amherst College, then earned a law degree at George Washington University in 1967. He's mainly toiled in the vineyards of patent law since; one of his current clients is the local office of Japan's Mitsubishi Electric Co.

But Tendler has never lost his taste for gadgetry.

In the 1980s, he developed an emergency signaling system for radios used by boaters. The device was produced by South Carolina-based Shakespeare Co. At the touch of a button, the radio would call for help and announce the latitude and longitude of the boat.

But the market for marine radios has dwindled. In 1995, Tendler decided to create a similar system for cell phones. The result was FoneFinder.

The Statewide Emergency Telecommunications Board, which oversees installation of enhanced 911 services throughout Massachusetts, is interested in Tendler's invention. Executive director Bob Watkinson said the device performed well in a field test.

"I need more time to take a look at it and see if it is practical," Watkinson said, adding, "from my perspective it is a major step forward."

Jim Barnett, vice president of marketing and sales at Hauppage, N.Y.-based Audiovox, said FoneFinder performed well in tests conducted by his company. "We know it works," he said. "The question now is to get one of the major carriers behind it so we can go into production."

Barrett said his company would need an order of at least 20,000 units to go into production.

Tendler said he's also talking with the Finnish cell phone maker Nokia, Motorola Inc., and with his client Mitsubishi about building FoneFinder into their products. Tendler said he figures the device would be popular with women who want extra security when traveling, and parents concerned about the safety of their children.

Tendler hopes to continue his patent law practice even if FoneFinder becomes a hit. But he has no intention of selling his company to some larger concern: He fears it will stumble without aggressive entrepreneurial leadership.

Instead, "I'm going to make money the old-fashioned way," he said. "I'm going to earn it."

CEO'S TOOLKIT FOR THE INFORMATION AGE

Bulletin Board

Location, Location, Location

Here's a nightmare scenario: You're far from home, lost, and driving through some mountain range on a snowy winter night when suddenly your car dies. Fortunately, you have your trusty cellular phone with you. But when you call 911 for help, you realize that you can't tell the dispatcher where you are—and that it could take him anywhere from five minutes to five days to trace your cellular signal.

Too bad you don't have FoneFinder with you. Developed by patent attorney Bob Tendler, chairman of Tendler Cellular, in Boston (800-896-4440), the miniature system, which can be integrated into just about any cellular phone, combines global-positioning-system (GPS) tracking technology with a voice-synthesis chip. All a caller has to do is push a special panic button mounted on the cell phone. The device automatically dials the nearest 911 service, and the synthesized voice announces its exact location. If all goes smoothly, says Tendler, cell-phone manufacturer Audiovox will have the system in its Model 405 come September. *—Joshua Macht*

ITS World

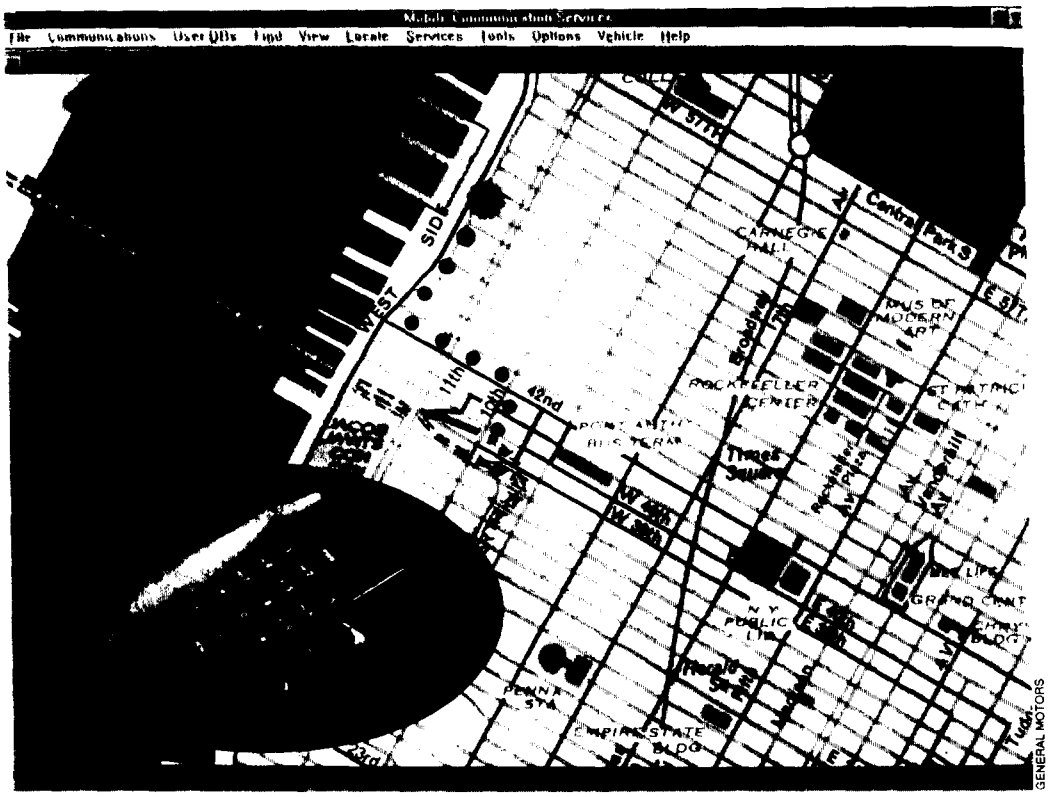
TECHNOLOGY AND APPLICATIONS FOR INTELLIGENT TRANSPORTATION SYSTEMS

On the Go with ITS

Technology Improves Service to Paratransit Clients

ITS Perspectives of ISTEA II

Closeup: Navigation Systems



GENERAL MOTORS

Mayday systems in passenger vehicles put stranded motorists in touch with a dispatcher in a response center who can display the location of the vehicle and send the appropriate assistance. Like most systems on the market, the OnStar system from General Motors, left, uses GPS for positioning and cellular telephone for communications.

provides some additional benefits. Traffic and weather information will soon be available via cellular phone for integration into travel plans, and an SOS feature will be able to relay coordinates to authorities in case of an emergency. When the vehicle is stationary, the onboard monitor can also be used as a television. The system is currently available in the United States as an option on BMW 5 and 7 Series models.

A route-guidance system is only as accurate as its digital-vector map database, the real brain of the program. One-way streets and other traffic limitations must be part of the database for the system to return safe and accurate routes. Navigation Technology (Sunnyvale, California) and Etak (Menlo Park, California) have led the drive to develop map databases. By the end of this year, most large cities in North America will have such maps fully developed and ready to use in most ITS navigational applications.

Mayday systems

Mayday systems are personal security products with tracking capabilities. Like all tracking systems, mayday devices require at least two technologies: positioning and communications. When a user of a mayday product activates the system, the coordinates and status of the individual are automatically relayed to a response center. The response center receives the coordinates of the distressed caller and dispatches authorities, medical aid, or roadside assistance. The public's increasing need for personal safety is generating a big market for mayday systems. In fact, the NavNET information service lists more than 22 such systems, up from five in April 1996.

The public's increasing need for personal safety is generating a big market for mayday systems.

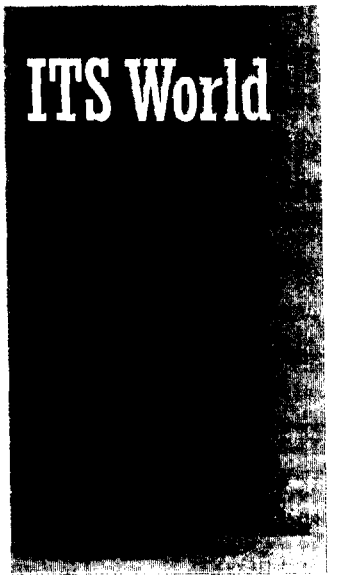
The OnStar system (General Motors), available as an option for 1997 Cadillacs, uses GPS for positioning and cellular telephone for communications. A driver activates the system by touching a button on the overhead console. The system sends voice and data signals to a service center, where digital maps display the position and status of the caller. Service representatives then call for emergency services or roadside assistance. The system reacts automatically if the airbags deploy or if an alarm is tripped to indicate that the vehicle has been stolen.

Other systems with similar features include OnGuard (ATX Research, San Antonio, Texas), the Lincoln RESCU (Ford Motor Company, Dearborn, Michigan), and a new system called Arthur (Motorola, Northbrook, Illinois; and Daimler-Benz, Stuttgart, Germany). A fifth system now in development is AutoLink (Prince, Holland, Michigan).

Another, quite different, personal security system is the FoneFinder (Tendler Cellular, Boston, Massachusetts). Rather than being installed in the vehicle, FoneFinder phones are carried on one's person and are therefore not limited to one vehicle or even one mode of transportation. The system is a self-contained cellular phone with an internal GPS engine and chip set.

The FoneFinder doesn't use a service center to receive and relay the position and status of the distressed individual. Instead, when the user activates the system by pressing a panic button, a special chip set automatically dials 911 and gives the caller's position (GPS coordinates), cellular phone number, and identity to the emergency dispatcher, using a synthesized voice. The 911 dispatcher can use paper maps to direct assistance to the individual or can type the coordinates into a computer to display the caller's location on a digital map.

The ITS navigation market has developed more slowly than expected, mainly because products were initially developed by "technology push" rather than by "market pull." The market is now taking off thanks to lower prices and increased functionality. ITS America predicts that an average of $6.7 billion per year will be spent on ITS navigation, tracking, and GPS-related products during the next fifteen years. ■



HAIRCUT RESTAURANT MOVIES

Boston

JOHN KERRY

AUGUST 1996/$3.95

SPECIAL ISSUE

REPORTER

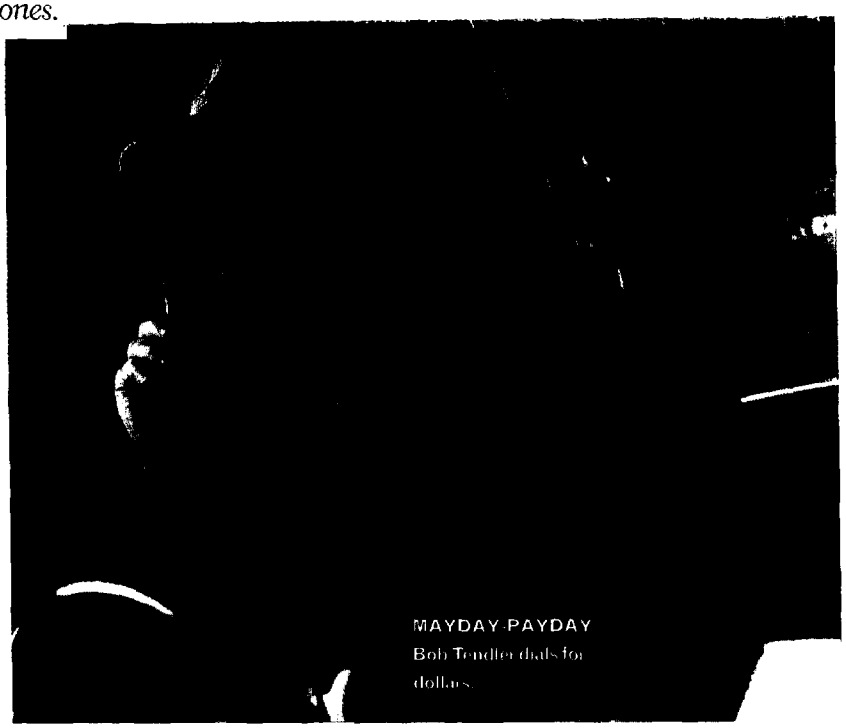
Mobile Mayday

Introducing enhanced 911 for cell-phones.

BOSTON, BROOKLINE, AND MILTON finally joined the rest of the civilized world earlier this summer when they installed enhanced 911 systems, giving police, fire, and medical dispatchers an automatic computer-screen display of a caller's phone number and address. Now, thanks to a local patent lawyer, a similar system may soon be in the offing for all the estimated 40,000 cellular 911 calls that are made every month in Massachusetts.

Attorney Bob Tendler believes that a chip he originally invented for boat radios offers a solution to a problem that has long dogged the wireless industry. Tendler's chip can put out a verbal mayday: When someone in trouble calls 911 on a cell-phone, a synthetic voice will automatically announce the caller's phone number and provide geographic coordinates from so-called global-position satellites. Emergency dispatchers can then punch in the coordinates they hear, and using standard mapping software or the Internet, get a bull's-eye on the caller's location.

One of the biggest cell-phone makers, Audiovox, has already agreed to include the chip in its phones, and Tendler is negotiating with four other large manufacturers: Nokia, Motorola, Mitsubishi, and Ericsson.



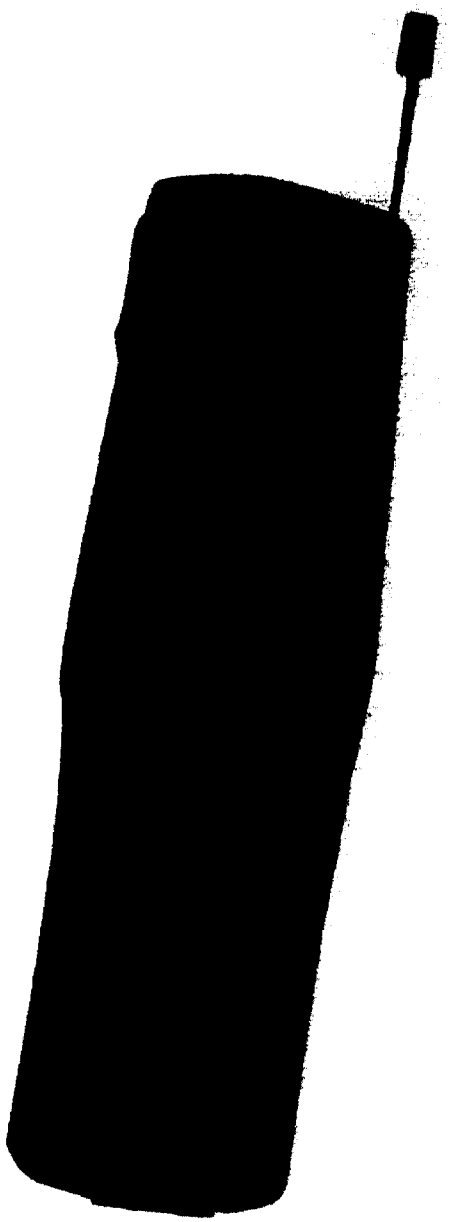
MAYDAY-PAYDAY
Bob Tendler dials for dollars.

Tendler figures that his system will end up adding an additional $4-a-month service charge to the bills of the nation's estimated 20 million cell-phone owners.

Says he: "It's nice when you can devise a simple solution to a pressing, complicated problem, and everybody wins."

—JOHN STRAHINICH

Today's Answer to the Cellular 9-1-1 Problem



Synthesized Voice Technology Gives Latitude & Longitude and the Callers Cellular Phone Number in English

With over 20 million cellular 9-1-1 calls annually, **PSAPS need help.** A push of the 9-1-1 button, and FONEFINDER® equipped phones tell you the caller's location and cellular phone number *in English.*

Cellular carriers and cellular phone manufacturers are ready to deploy FONEFINDER® phones nationwide.

All that is needed is a low cost electronic mapping system for 9-1-1 dispatch operations that permits converting GPS Latitude and Longitude to a bull's eye on the map. *(Approximately $300)*

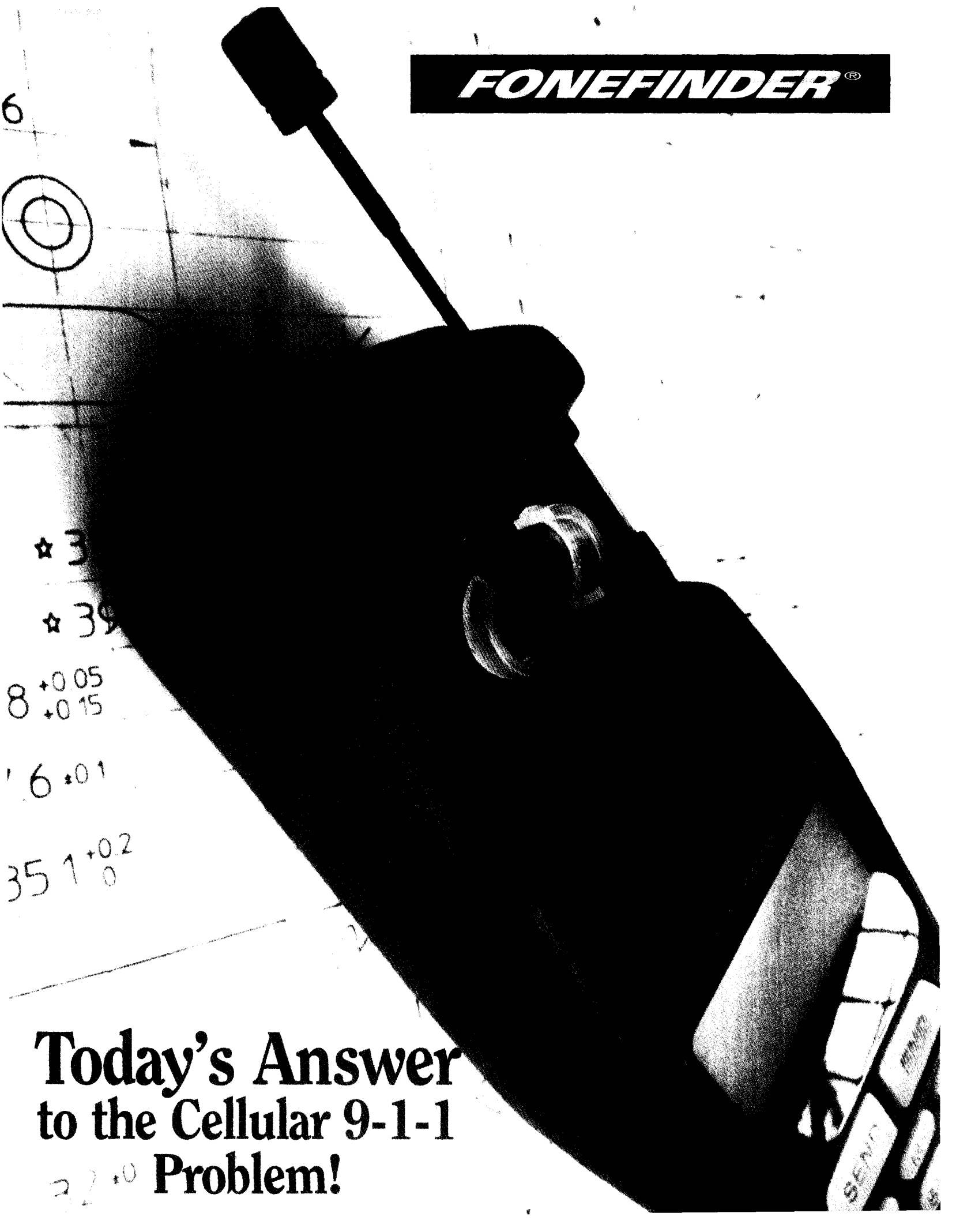
Help is at hand, and with your support, FONEFINDER® technology can begin saving lives immediately.

FOR MORE INFORMATION CONTACT:

CELLULAR

65 Atlantic Avenue, Boston MA 02100

800-896-4440


FONEFINDER®
Today's Answer
to the Cellular 9-1-1
Problem!

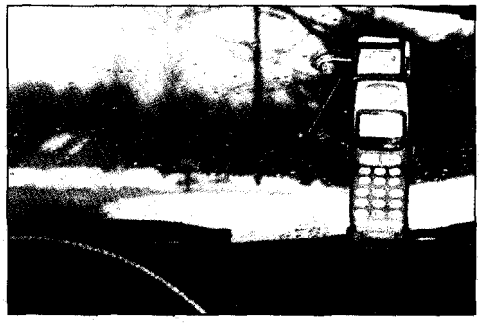
For the More Than 20 Million Cellular 9-1-1 Calls Per Year

FONEFINDER®

The patented FoneFinder system is today's answer to finding cellular 9-1-1 callers, *NOW.* While struggles continue with infrastructure and deployment which can take years, FONEFINDER provides police, fire and medical response personnel the needed information to locate cellular 9-1-1 callers *immediately.*

Push the 9-1-1 button on FONEFINDER and synthesized voice technology gives GPS based latitude and longitude and the caller's cellular phone number *in English.*

For everyone who needs the ability to locate a cellular 9-1-1 caller, FONEFINDER is *Today's Answer.*



- Calls Go Directly to PSAP
- Talk Directly to Caller
- No Installation Required
- No Infrastructure
- Instant Deployment
- Universal Coverage
- Meets or Exceeds FCC Requirements
- No Cost to the PSAP**

***Tendler Cellular offers a low cost electronic mapping system that permits converting latitude & longitude to a bullseye on the map, making them easier to find. (approximate cost $300).*

Cellular Carriers and Cellular Phone Manufacturers are Ready to Deploy FONEFINDER® Phones Nationwide

For information on FONEFINDER, contact

TENDLER CELLULAR

65 Atlantic Avenue Boston, MA 02110
Or Call

800-896-4440

9-1-1 EMERGENCY NENA

NENA News

A PUBLICATION OF THE NATIONAL EMERGENCY NUMBER ASSOCIATION VOL. 14 NO. 4 • DECEMBER 1996

Vendor News

Introducing FoneFinder™ — A Solution Today to the Personal Safety Crisis

The problem of EMS dispatchers locating cellular 9-1-1 calls is overwhelming. This has caused the FCC to issue Docket 94-102 requiring all carriers and cell phone manufacturers to identify the location of 9-1-1 calls. With the FoneFinder, this is possible TODAY!

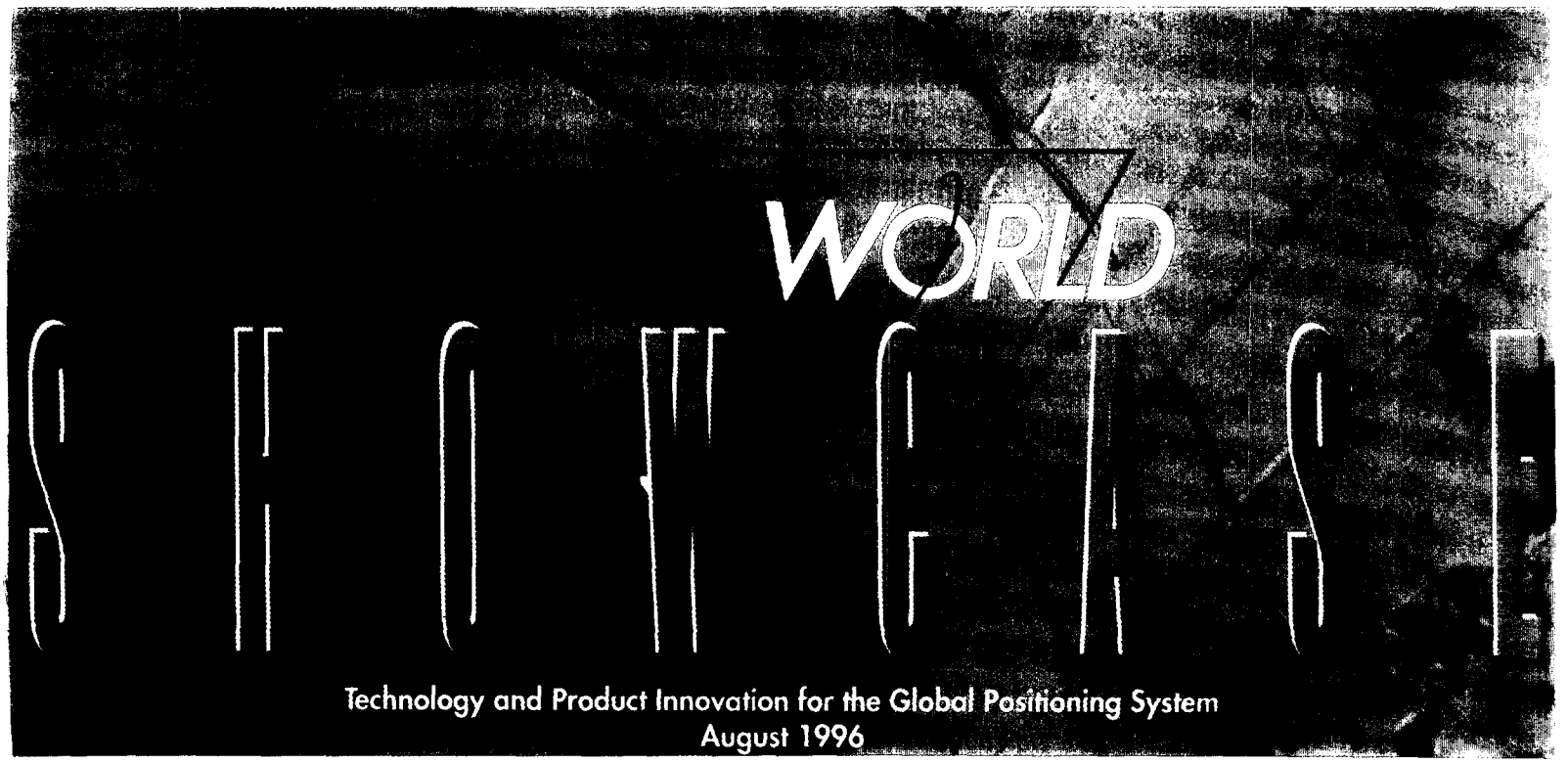
Tendler Technologies has developed and patented the first-ever system for reporting to dispatch centers the location of the stricken individual through telling the dispatcher in English where the caller is. This is done through voice synthesis in which the FoneFinder tells the location of the phone calling 9-1-1 to the dispatcher. FoneFinder phones are provided with an internal GPS engine and the FoneFinder chip set which is utilized to tell the EMS dispatcher the location of the stricken individual, the cellular telephone number, the identity of the individual, and other information.

The system requires absolutely no interstructure, either at the cell site or at the dispatch center. Because transmission uses the normal audio channel, cell sites do not need to be adapted to any particular digital format. More importantly, the system is instantly deployable through the provision of the FoneFinder phones.

Tendler Cellular provides the FoneFinder function through its sale of chip sets to cellphone manufacturers such as Mitsubishi, Audiovox, Nokia, Motorola and Ericcson. In addition to providing the FoneFinder chip sets, for those dispatch services which do not have electronic maps, Tendler Cellular provides an extremely inexpensive mapping system.

For more information, contact Tendler Cellular at 617-566-6953.

FoneFinder™ by Tendler Cellular



Cellular emergency locater

Tendler Cellular has developed and patented FoneFinder, a system for reporting to emergency dispatch centers the location, identity, and cellular telephone number of a stricken individual. Once activated — either by dialing 911 or through optional activation methods, such as when an airbag is released — the FoneFinder system conveys information over a normal audio channel to the dispatch center through voice simulation. No additional equipment is required, as the system contains an internal Motorola Encore GPS engine. The FoneFinder chip is being sold to cellular phone manufacturers. **Tendler Cellular,** Boston, Massachusetts, USA.

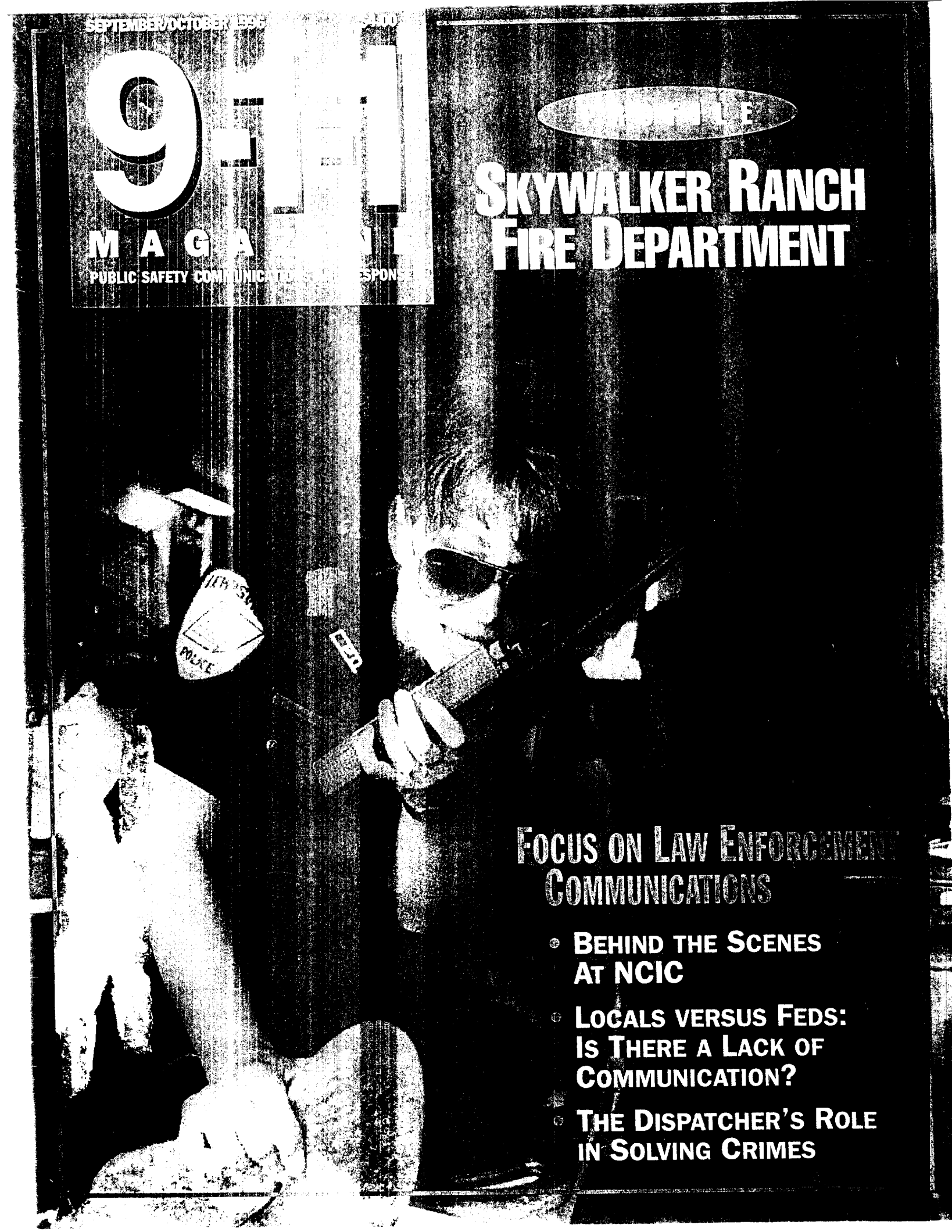
Circle 130

SEPTEMBER/OCTOBER 1996

9-1-1 MAGAZINE

PUBLIC SAFETY COMMUNICATIONS RESPONSE

SKYWALKER RANCH FIRE DEPARTMENT



FOCUS ON LAW ENFORCEMENT COMMUNICATIONS

- BEHIND THE SCENES AT NCIC
- LOCALS VERSUS FEDS: IS THERE A LACK OF COMMUNICATION?
- THE DISPATCHER'S ROLE IN SOLVING CRIMES

FoneFinder Locates Cellular 9-1-1 Callers Now

While the FCC will soon be requiring that cellular carriers and manufacturers provide a means to identify the location of wireless 9-1-1 calls, the solution is tenuous, costly, and years away. Locating cellular 9-1-1 calls accurately continues to challenge emergency dispatchers, especially for EMS calls. It has been estimated that there are currently 27 million cellular 9-1-1 calls annually within the United States with an expected annual growth rate of 40-60%. The five or so minutes it may take to ascertain the caller's exact location can compromise a timely emergency response in a large percentage of these calls.

Tender Technologies, of Boston, Massachusetts, has developed and patented the first ever system for reporting to dispatch centers the location of a stricken individual through a voice synthesis module which verbally announces the latitude and longitude coordinates of the phone when it calls 9-1-1. "The system is GPS based and requires absolutely no infrastructure, either at a cell site or at the dispatch center," said Chairman Robert K. Tendler. "At the emergency communications center, a call taker only has to punch in the latitude and longitude he hears using available software products or the Internet and obtain a map pinpointing the caller's location," Tendler told *Wireless Week* magazine.

FoneFinder phones are provided with an internal GPS engine and a chip set which is utilized to announce the phone's location and the cellular telephone number, in English, to the dispatcher. To utilize the system, Tendler said, a PSAP need only have or obtain a mapping program running on a personal computer than can translate the lat/long coordinates into a bull's eye on the map to obtain a street address. Tendler Cellular provides an inexpensive mapping program through Delorme Mapping which provides maps on floppy disks at a cost of no more than $300 per county.

Because the transmission uses the normal audio channel, cell sites need not be adapted to any particular digital format. More importantly, the system is instantly deployable. It can be fit into newly designed phones such as those from Audiovox, as well as retrofitted into hands-free kits designed for Motorola's flip phones.

The FoneFinder system can be provided to callers at zero cost, with a monthly fee of only $4 to cover the added phone hardware. An optional service, the 9-1-1 Back-Up System can also be activated, in which a customer service center makes sure help is on the way. "A portion of the cost of this 9-1-1 Backup service is to be shared with the PSAPs to defray costs and help pay for new equipment," said Tendler.

"The biggest problem that faces cellular 9-1-1 PSAPs is that the caller usually does not know their location. [This] concept addresses that issue," said Donald C. Nagle, Jr., Communications Director for the Massachusetts State Police. "Most 9-1-1 PSAPs are already equipped with some sort of a mapping program, [so] the verbal GPS information could be handled easily in the dispatch environment."

PUBLIC SAFETY Communications

Emergency Cellular System Calls PSAP and 'Tells' Where to Send Help

By Assistant Editor Erik Edenholm

The Answer to the Cellular Location Problem?

For years, ships in trouble have been transmitting mayday calls on radio frequencies giving their position to passing vessels and the Coast Guard. But unlike ships, people using cellular phones to call for help have no way to tell public safety agencies where to send help if they don't know their location or can't speak.

Tendler Cellular of Boston, Massachusetts, has developed a way to give public safety agencies the location information needed to dispatch help quickly to cellular callers. The company's system for locating cellular callers does not require sophisticated technology. It is an attachment to cellular phones that with the push of a button dials 9-1-1 and broadcasts a mayday message.

The message is a computer-synthesized voice that simply states the name, phone number and the last latitude and longitude coordinates of the cellular caller. The device knows those coordinates because of a built-in global positioning system (GPS) receiver. The receiver measures signals from a constellation of U.S. military satellites to determine the latitude and longitude coordinates.

Tendler Cellular calls its chipset system "The Fonefinder." The company said the system can be added for about $150 to even the smaller cellular phones on the market.

The cost for a PSAP to make use of this

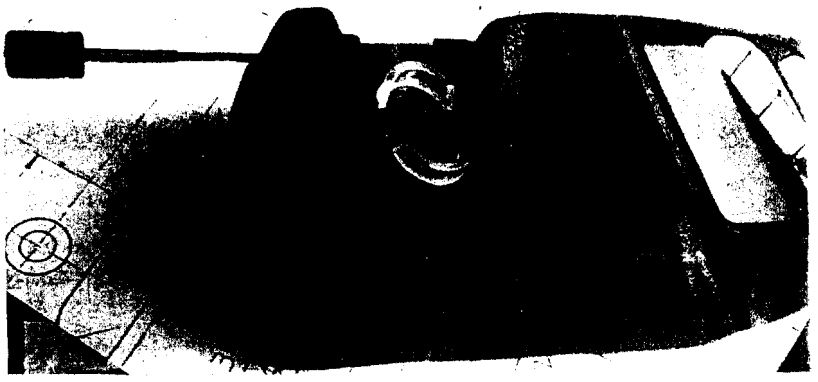
To Page 125

From Page 121

system is not much higher. All that is needed is a mapping program running on a personal computer that can translate latitude and longitude coordinates into a street address. Tendler said there are several of these programs available for about $300 each.

In addition to providing cellular location to 9-1-1 PSAPs, the company is offering an additional backup service to consumers. In an emergency when the device's red button atop the phone is depressed, and after sending the location information to a 9-1-1 PSAP, the phone dials a customer service center and repeats the same information. A customer service agent then calls the cellular phone. If there is no answer, the customer service agent calls the PSAP to see if help was dispatched.

That backup call service costs the consumer $50. Tendler said part of the $50 would be given back to PSAPS as an incentive for handling these types of calls which take more work to process. The revenue from the $50 charge is split this way: $20 to the dispatcher, $20 to the cellular carrier, $5 to the PSAP. Tendler said the charge also will make people think twice before calling 9-1-1. "Someone can always dial 9-1-1 without using our button (on the cellular phone attachment)," Tendler said. "So people have to think, 'Is this really an emergency?'." The company also has plans to market a cradle for hand-held phones to be placed in while driving. The cradle will not be just a place to put the phone when not in use. It will serve as a way to activate the phone and send a distress signal if the car is in an accident. Tendler said that crash sensors in a car's frame would activate the phone to call 9-1-1 and give a message telling the latitude and longitude of the car and a license plate number.



The 9-1-1 device mounts on the top and back side of the cellular phone.

Through the cradle, the phone also can be connected to a car-theft alarm. If the alarm is activated, the phone dials 9-1-1 and gives a message saying "stolen car" and giving the latitude and longitude coordinates at the time of the call.

Massachusetts State Police Communications Director Don Nagle said public safety is in need of a way to find callers today, not five years from now. The FCC has been looking at several technologies to locate callers, but most need expensive infrastructure improvements.

Nagle, a member of the Atlantic Chapter of APCO International, said the need for a way to find callers was [illegible] in a recent incident in which a women was abducted, driven to a remote area outside of Boston and raped.

After her attackers fled, she dialed 9-1-1 on her cellular phone. Dazed from the attack, she was able to offer little information to call-takers as to her location.

"The call-taker stayed on the line with the victim for the entire time as police officers drove around the area the described by the victim with lights flashing and sirens blaring," Nagle said. "After 45 minutes of an intense search, the victim was found and brought to a hospital.

"It appears that (Tendler Cellular) has a very good concept, one that is driven by customers, not driven by rulemaking, manufacturers or the cellular companies. We would all like to see cellular work like landline enhanced 9-1-1, but I don't think it is going to happen."

"If there is a final solution to the problem eight years from now that is a better solution than a system like this, we will use it. We need this information now, in any way shape or form we can take it," Nagle said. ▲

Opinion

Rikki Lee
SENIOR EDITOR

2001: An Odyssey For E911?

The FCC was expected last week to release the full text of its rules requiring carriers to provide automatic number and location information for enhanced 911 calls made from wireless phones.

Within a year, carriers must transfer 911 calls placed from activated wireless phones to public safety answering point centers. If requested by PSAPs, carriers must also transfer calls from phones without mobile identification numbers.

Within 18 months, a carrier must supply the PSAP with a 10-digit ANI and the location of the base station or cell site where the call originated. Within five years, carriers must also send accurate wireless ALI information.

In formulating its rules, the commission relied on guidance from a coalition of industry groups: the Cellular Telecommunications Industry Association, the National Association of State Nine-One-One Administrators, the National Emergency Number Association and the Association of Public-Safety Communications Officials International.

As a result, few surprises are expected. Carriers hope the ruling will set acceptable guidelines for funding and technology choice. However, the wireless industry and public safety will want to read the fine print and seek out "the devil in the details," as one carrier's regulatory counsel put it.

Nearly all the expense of building 911 systems to date has fallen on government-supported public safety agencies. The burden of funds collection mainly rests with wireline providers, although 25 percent of all 911 calls are dialed on wireless devices.

This may be changing. After requests by PSAPs in some Texas cellular markets, Southwestern Bell Mobile Systems Inc. began adding a 911 charge to customers' monthly statements.

On the technology side, we will soon see vendors making the rounds with their ANI/ALI products. "The industry needs to work together in choosing the right technology," said Stephanie Cassioppi, director of external affairs for Ameritech Cellular Services Inc.

And technology is already out there. Boulder, Colo.-based SCC Communications Corp. is prepared to transmit wireless carrier ALI subscriber data to E911 PSAPs.

"We're excited about being on the leading edge trying to prove how wireless ALI can be done," said Eric Sorensen, SCC's product marketing manager.

Several vendors and a few carriers think infrastructure equipment should generate a caller's location using calculations such as time difference of arrival or angle of arrival. Network proponents said it would be difficult to retrofit more than 30 million wireless phones with a global positioning system receiver.

"We really have an extremely attractive solution," said Louis Stilp, vice president and general manager of Pittsburgh's The Associated Group Inc. Three years ago, Stilp and company developed the TDOA-based TruePosition system. The technology is being deployed in a New Jersey trial.

Meanwhile, Tendler Cellular Inc. in Boston is turning heads with its FoneFinder GPS receiver and speech chip. "Carriers will need to have wireless ALI in latitude and longitude, and we can do that by September with zero additional infrastructure," said Chairman Robert Tendler.

In the final analysis, wireless ANI/ALI systems should have at least the reliability, coverage and accuracy of wireline systems.

July 2001 will be here in no time. Will wireless be ready?

Wireless ANI/ALI systems should have at least the reliability, coverage and accuracy of wireline systems.

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Wireless
WEEK
May 20, 1996
Cellular

Wireless Locator Soon A Reality

Tendler Cellular Markets GPS-based Chip To Vendors

By Charles Mason

A woman is abducted and driven to a remote area outside of Boston. There, she is raped and left for dead. Dazed, she reaches for a cellular phone that sits in the car and dials 911. However, she doesn't know where she is. Offering a rough description of the area, it takes the police 45 tense minutes to find her and take her to a hospital.

While most cases of cellular 911 calls and the occasional difficulty in finding those callers are not as dramatic, the problem confronts emergency workers daily.

"We should have had some way of finding that woman in minutes, not three-quarters of an hour," said Don Nagle, director of telecommunications for the Massachusetts State Police. "Suppose she had been bleeding to death. We had to send police cars to the area and have them cruise with their sirens on until the woman could tell us that she heard them. This is not the way it should be. This is not the way it is with landline phones."

As a chief communications officer in one of the most densely populated states in the United States, Nagle is familiar with attempts by the FCC, wireless industry groups and public safety organizations to find solutions.

Tendler Cellular's FoneFinder

"The problem is, the solutions being developed are expensive and several years away," he said. "They involve infrastructure changes. That isn't practical. We need some help today."

Robert Tendler, chairman of Boston-based Tendler Cellular, claims he has a solution that will be available this year. Tendler said he has developed a chip that, through the global positioning system's network of satellites, can assist emergency workers.

Tendler said his firm is working with Audiovox Corp. and Nokia Mobile Phones Inc. to include the technology in their phones.

Tendler's device is working as a prototype in Audiovox's model 405 cellular phone. When a person dials 911, a synthetic voice announces the coordinates and the cellular phone number to the call taker.

"At the emergency communications center, a call taker only has to punch in the numbers using available software products or the Internet and obtain a map pinpointing the caller's location," Tendler said.

Tendler claims to have orders for test units from several cellular carriers, including Bell Atlantic Nynex Mobile Inc., AT&T Wireless Services Inc., GTE Corp., and Comcast Corp.

"We can have this product commercially available by the fall," he said.

In addition to being fitted into newly designed phones, Tendler said the system can be retrofitted into hands-free kits designed for Motorola Inc.'s flip phones.

Besides helping victims in real emergencies, Tendler's GPS-based chip might alleviate a new problem that is cropping up. "We had a recent incident where gang members in Worchester used cellular phones to make 911 calls and report trouble where there was no trouble," Nagle said. "This was done to divert police attention away from where the gang was committing a crime."

If the gang's phones had been equipped with a location chip, law enforcement might have been able to track their calls and shut down the operation.

Nagle said he is interested in Tendler's product.

"It's certainly not the end-all, be-all solution," Nagle said, "but it is a solution that will be available this year or five years from now. If it saves one life, it's worth considering. When you consider the onslaught of wireless phones that are going to hit the market with personal communications services, the problem is only going to get much, much worse before it gets any better." W

GPS WORLD Newsletter

April 10, 1996

Products & Industry Progress

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FONEFINDER

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CELLULAR

INTRODUCING **FONEFINDER** tm
A SOLUTION **TODAY** TO THE PERSONAL SAFETY CRISIS

THE PROBLEM

The problem of EMS dispatchers locating cellular 911 calls is overwhelming. It is estimated that currently there are 27 million cellular 911 calls annually in the United States. The problem is even worse because it takes at least 5 minutes to locate the caller. To add perspective to this "cellular dilemma", approximately 10 million cellular phones were sold in the US alone last year and industry sources predict a compound annual growth rate of 40-60%! This has caused the Federal Communications Commission to promulgate an NPRM requiring all carriers and cell phone manufacturers to identify the location of 911 calls. The response to the NPRM has been a flurry of responses, all of which proposing to delay any implementation for further study. The reason is primarily cost and agreement as to what digital format to use.

Beacon systems with the attendant cost of between $500K and $50K per cell site (to say nothing of implementation taking one and one-half to two years per community) are unsuitable to provide immediate assistance to EMS dispatch centers.

GPS based systems which are solely digital are either expensive due to utilization of modems or are impractical to implement due to a lack of agreement on format.

THE SOLUTION

Tendler Technologies has developed and patented the **first-ever** system for reporting to dispatch centers the location of the stricken individual through telling the dispatcher **in English** where the caller is. This is done through voice synthesis in which the FoneFinder tells the location of the phone calling 911 to the dispatcher. **The system is GPS based and requires absolutely no interstructure, either at a cell site or at the dispatch center.**

FoneFinder phones are provided with an internal GPS engine and the FoneFinder chip set which is utilized to tell the EMS dispatcher the location of the stricken individual, the cellular telephone number, the identity of the individual, and other information, all in English. Because the transmission is in English and uses the normal audio channel, cell sites do not

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